DARYL R. DEFORD

Curriculum Vitae

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ACADEMIC APPOINTMENTS

Vassar College, Poughkeepsie, NY — *August 2025 – Present*
Assistant Professor of Statistics – Department of Mathematics and Statistics

Washington State University, Pullman, WA — *August 2020 – May 2025*
Assistant Professor of Data Analytics – Department of Mathematics and Statistics
Earned Tenure and Promotion to Associate Professor to begin Fall 2025

Massachusetts Institute of Technology, Cambridge, MA — *June 2018 – July 2020*
Postdoctoral Associate – CSAIL Geometric Data Processing Group
Advisor: Justin Solomon

EXTERNAL APPOINTMENTS

Washington State University, Pullman, WA — *June 2025 – Present*
Adjoint Faculty Member – Department of Mathematics and Statistics

Simons Laufer Mathematics Sciences Research Institute — *August 2023 – December 2023*
Research Member – Program in Algorithms, Fairness, and Equity

Tufts University, Medford, MA — *June 2018 – July 2020*
Visiting Scholar – Jonathan M. Tisch College of Civic Life
Advisor: Moon Duchin

EDUCATION

Dartmouth College, Hanover, NH — *September 2013 – June 2018*
Ph.D. Mathematics — *Awarded June 2018*
Advisor: Dan Rockmore
Dissertation: Matched Products and Dynamical Models for Multiplex Networks
A.M. Mathematics — *Awarded November 2014*

Washington State University, Pullman, WA — *August 2010 – May 2013*
B.S. in Theoretical Mathematics — *Awarded May 2013*
Summa Cum Laude

RESEARCH PUBLICATIONS

* denotes undergraduate coauthors and ** denotes graduate student coauthors

Data Science of Redistricting and Elections

1. **D. DeFord**, G. Herschlag, and J. Mattingly: *A Cycle Walk for Sampling Measures on Spanning Forests for Redistricting*, submitted, 2025.
2. **D. DeFord** and A. McWhorter**: *Free Elections in the Free State: Ensemble Analysis of Redistricting in New Hampshire*, submitted, 2025.
3. **D. DeFord** and E. Veomett: *Bounds and Bugs: The Limits of Symmetry Metrics to Detect Partisan Gerrymandering*, Election Law Journal, Accepted, 2025.

4. S. Cannon, **D. DeFord**, and M. Duchin: *Repetition effects in a Sequential Monte Carlo sampler*, arXiv:2409.19017, 2024.
5. **D. DeFord**, E. Kimsey*, and R. Zerr: *Multi-Balanced Redistricting*, Journal of Computational Social Science, 6, 923–941, 2023.
6. **D. DeFord**, N. Dhamankar**, M. Duchin, V. Gupta**, M. McPike**, G. Schoenbach*, and K. W. Sim*: *Implementing Partisan Symmetry: Problems and Paradoxes*, Political Analysis, 31(3), 305-324, 2023.
7. **D. DeFord**, N. Eubank, and J. Rodden: *Partisan Dislocation: A Precinct-Level Measure of Representation and Gerrymandering*, Political Analysis, 30(3), 403-425, 10.1017/pan.2021.13, 2022.
8. **D. DeFord**, M. Duchin, and J. Solomon: *ReCombination: A family of Markov chains for redistricting*, Harvard Data Science Review, 3(1), 2021.
9. J. Clelland, **D. DeFord**, H. Colgate*, B. Malmskog, and F Sancier-Barbosa: *Colorado in Context: Congressional Redistricting and Competing Fairness Criteria in Colorado*, Journal of Computational Social Science, 5(1), 189-226, doi:10.1007/s42001-021-00119-7, 2021.
10. Elle Najt, **D. DeFord**, and J. Solomon: *Empirical Sampling of Connected Graph Partitions for Redistricting*, Physical Review E, 104(6), 064130, 2021.
11. **D. DeFord**, M. Duchin, and J. Solomon: *A Computational Approach to Measuring Vote Elasticity and Competitiveness*, Statistics and Public Policy, 7(1), 69-86, 2020.
12. S. Caldera*, **D. DeFord**, M. Duchin, S. Gutekunst**, and C. Nix*: *Mathematics of Nested Districts: The Case of Alaska*, Statistics and Public Policy, 7(1), 39-51, 2020.
13. Elle Najt**, **D. DeFord**, and J. Solomon: *Complexity and Geometry of Sampling Connected Graph Partitions*, arXiv: 1908.08881, 2019.
14. **D. DeFord** and M. Duchin: *Redistricting Reform in Virginia: Districting Criteria in Context*, Virginia Policy Review, 12(2), 120-146, 2019.

Statistics, Optimization, and Computation

1. J. Briscoe**, G. Kepler**, **D. DeFord**, and A. Gembredhin: Algorithmic Accountability in Small Data: Sample-Size-Induced Bias Within Classification Metrics, AISTATS, 2025.
2. **D. DeFord** and S. Ethier: *Does the first-serving team have a structural advantage in pickleball?*, AMS Contemporary Mathematics Series, to appear 2025.
3. D. Wu*, D. Palmer**, and **D. DeFord**: *Maximum a Posteriori Inference of Random Dot Product Graphs via Conic Programming*, SIAM Journal on Optimization, 32(4), 2527–2551, 2022.
4. P. Zhang**, **D. DeFord**, and J. Solomon: *Medial Axis Isoperimetric Profiles*, Computer Graphics Forum, 39(5), 1-13, 2020.
5. **D. DeFord**, H. Lavenant**, Z. Schutzman**, and J. Solomon: *Total Variation Isoperimetric Profiles*, SIAM J. Appl. Algebra Geometry, 3(4), 585—613, 2019.
6. **D. DeFord** and K. Moore**: *Random Walk Null Models for Time Series Data*, Entropy, 19(11), 615, 2017.
7. B. Breen**, **D. DeFord**, J. Linehan**, and D. Rockmore: *Fourier Transforms on $SL_2(\mathbb{Z}/p^n\mathbb{Z})$ and Related Numerical Experiments*, arXiv:1710.02687, 2017.
8. **D. DeFord** and P. Doyle: *Cyclic Groups with the same Hodge Series*, Revista de la Uniòn Matemática Argentina, 59(2), 241–254, 2018.
9. **D. DeFord** and A. Kalyanaraman: *Empirical Analysis of Space-Filling Curves for Scientific Computing Applications*, Proc. 42nd International Conference on Parallel Processing, 170-179, 2013.

Network Science and Combinatorial Graph Theory

1. A. Vishnevskaya** and **D. DeFord**: Exploring China's Twiplomacy in COVID-19 pandemic: Social Network & Sentiment Analyses of the "Chinese Embassy in U.S." Twitter (X) Account, Submitted 2024.
2. A. Barghi and **D. DeFord**: *Labeled Graph Rearrangements on Matched and Star Products*, Submitted 2024.
3. A. Barghi and **D. DeFord**: *Ranking Trees Based on Global Centrality Measures*, Discrete Applied

Mathematics, 343, 231-257, 2024.
4. A. Barghi and **D. DeFord**: *Stirling Numbers of Uniform Trees and Related Computational Experiments*, Algorithms, 16(5), 223, 2023.
5. **D. DeFord** and D. Rockmore: *On the Spectrum of Finite, Rooted Homogeneous Trees*, Linear Algebra and its Applications, 598, 165-185, 2020.
6. **D. DeFord** and S. Pauls: *Spectral Clustering Methods for Multiplex Networks*, Physica A: Statistical Mechanics and its Applications, 533, 121949, 2019.
7. **D. DeFord** and S. Pauls: *A New Framework for Dynamical Models on Multiplex Networks*, Journal of Complex Networks, 6(3), 353—381, 2018.
8. **D. DeFord**: *Multiplex Dynamics on the World Trade Web*, 6th International Conference on Complex Networks and Applications, Studies in Computational Intelligence, Springer, 1111–1123, 2018.
9. **D. DeFord** and D. Rockmore: *A Random Dot Product Model for Weighted Networks*arXiv: 1611.02530, 2016.
10. **D. DeFord**: *Enumerating Tilings of Rectangles By Squares*, Journal of Combinatorics, 6(3), 339-351, 2015.
11. **D. DeFord**: *Enumerating Distinct Chessboard Tilings*, Fibonacci Quarterly, 52(5), 102-116, 2014.
12. K. Atanassov, **D. DeFord**, and A. Shannon: *Pulsated Fibonacci Sequences*, Fibonacci Quarterly, 52(5), 22-27, 2014.
13. **D. DeFord**: *Seating Rearrangements on Arbitrary Graphs*, Involve: A Journal of Mathematics, 7(6), 787-805, 2014.
14. **D. DeFord**: *Counting Rearrangements on Generalized Wheel Graphs*, Fibonacci Quarterly, 51(3), 259-273, 2013.

Expository Redistricting Articles

1. **D. DeFord**: *Redistricting Graphics*, MAA Focus, 44(3), 35, 2024.
2. **D. DeFord** and M. Duchin: *Random Walks and the Universe of Districting Plans*, Book Chapter in *Political Geography*, Birkhäuser, 2022.
3. J. Clelland, **D. DeFord**, and M. Duchin: *Aftermath: The ensemble approach to political redistricting*, MAA Math Horizons, 28(1), 34-35, 2020.

Technical and Expert Reports

1. **D. DeFord**: *Expert Report Analyzing Alternative Election Systems in Mount Pleasant New York*, for Serratto Plaintiffs, 2024.
2. **D. DeFord**: *Expert Report in Wisconsin State Supreme Court*, for Wright Petitioners, 2024.
3. J. Amunson, A. Becker, **D. DeFord**, D. Gold, and S. Hirsch: *Amicus Brief of Computational Redistricting Experts*, Merrill vs. Milligan, Supreme Court, 2022.
4. **D. DeFord**: *Expert and Rebuttal Reports in Pennsylvania Commonwealth Court*, for Math/Science Petitioners, 2022.
5. **D. DeFord**: *Expert and Rebuttal Reports in Wisconsin State Supreme Court*, for Citizen Mathematicians and Scientists, 2021 and 2022.
6. J. Clelland, **D. DeFord**, B. Malmskog, and F. Sancier-Barbosa: *Ensemble Analysis for 2021 Legislative Redistricting in Colorado, First and Second Staff Plans*, Colorado in Context Report, 2021.
7. J. Clelland, **D. DeFord**, B. Malmskog, and F. Sancier-Barbosa: *Ensemble Analysis for 2021 Congressional Redistricting in Colorado*, Colorado in Context Report, 2021.
8. **D. DeFord**, M. Duchin, and J. Solomon *Comparison of Districting Plans for the Virginia House of Delegates*, MGGG Technical Report, 2019.
9. G. Charles, J. Clelland, **D. DeFord**, A. Dorman**, M. Duchin, J. Ellenberg, L. Fuentes-Rohwer, T. Jarvis, N. Guillen, D. Morozov, E. Mossel, D. Paikowsky**, D. Randall, J. Solomon, A. Stern, R. Tholin**: *Amicus Brief of Mathematicians, Law Professors, and Students*, Rucho v. Common Cause, Supreme Court, 2019.
10. H. Angulu*, R. Buck*, **D. DeFord**, M. Duchin, H. Fain, M. Hully**, M. Khan*, Z. Schutzman**,

and O. York: *Study of Reform Proposals for Chicago City Council*, MGGG Technical Report, 2019.

TEACHING EXPERIENCE

Vassar College Poughkeepsie, NY
Assistant Professor *Fall 2025 - Present*

MATH 144 - Foundations of Data Science *Fall 2025*

This course focuses on the development and practice of computational and inferential thinking. Students are introduced to the fundamentals of programming and inference. Students learn to write programs, create data visualizations, and work with real-world datasets, culminating in a final data analysis project.

MATH 240 - Introduction to Statistics *Fall 2025*

The purpose of this course is to introduce the methods by which we extract information from data, with more coverage of probability and more intense computational and computer work. Statistical software is introduced and used.

Washington State University Pullman, WA
Assistant Professor *Fall 2020 - Spring 2025*

- * denotes courses I designed and developed for the (asynchronous) WSU Global Campus. For these courses I developed the syllabus, recorded all of the lecture videos, and created the assignments and activities. For Data 115 I also taught the (hybrid) in-person version of the course during the semesters listed below.

MATH 325 - Elementary Combinatorics *Spring 2025*

Introduction to combinatorial theory, including counting methods, binomial coefficients and identities, generating functions, occurrence relations, inclusion-exclusion methods.

MATH 555 - Topics in Combinatorics Spring 2025

Graduate course in combinatorics covering generating functions, recurrence relations, inclusion-exclusion, coding theory, experimental design, and graph theory.

MATH 554 - Advanced Graph Theory *Fall 2024*

Second course in graph theory for graduate students covering matchings, colorings, extremal graph theory, graph algorithms, algebraic and spectral methods, and random graph models.

MATH 588 - Topics in Computational Mathematics *Spring 2024*

Graduate topics course focusing on discrete and computational methods for modeling social systems with an emphasis on social network analysis and the mathematics of political redistricting.

STAT 437 - High Dimensional Data Learning and Visualization *Spring 2024*

Data visualization, metric-based clustering, probabilistic and metric-based classification, algebraic and probabilistic dimension reduction, inferential methods, analysis of non-Euclidean data.

Data 319* - Model-based and Data-based Methods for Data Analytics *Summer 2023*

Modeling methods for data analysis with high dimensional data, including theoretical and practical concerns as well as a focus on data mining techniques.

Math 555 - Topics in Combinatorics: The Probabilistic Method *Spring 2023*

Graduate topics course focusing on combinatorial proof techniques including probabilistic methods for nonconstructive proofs in graph theory.

Math 587 - Representation Theory *Fall 2022*

Graduate topics course covering representations of finite groups with a particular emphasis on S_n, character theory, and basic Lie representations, with applications to Fourier analysis, spectral graph theory, and random walks.

STAT 536 - Statistical Computing *Fall 2022*

Modern computing methods for statistical application and research including generation of random variables, Monte Carlo simulation, bootstrap and jackknife methods, EM algorithm, and Markov chain Monte Carlo methods.

Math 533 - Teaching College Mathematics *Fall 2022*

Theory and practice of mathematics instruction at the collegiate level. This course is designed to support TAs in the Department of Mathematics and Statistics. This includes not just pedagogical development but also provides a broader introduction to the various cultures of academia.

Data 302* - Python for Data Analytics *Summer 2022*

Initial Python course for data analytics majors including an introduction to programming, flow, and data structures as well as emphasis on data and visualization packages.

Math 448/548 CPT_S 430/530 - Numerical Analysis *Spring 2022*

Fundamental course on numerical computation, including: finding zeroes of functions, approximation and interpolation, numerical integration, numerical solution of ordinary differential equations, and numerical linear algebra.

STAT 419 - Introduction to Multivariate Statistics *Fall 2021*

Introductory course covering multidimensional data, multivariate normal distribution, principal components, factor analysis, clustering, and discriminant analysis.

Data 115* - Introduction to Data Analytics *Fall 2020, 2021 Spring 2021*

Basic techniques and methodology of data science, with an emphasis on data processing and software tools. This course provides a foundation for beginning data analytics majors as well as students from across the university who are looking to develop data and quantitative literacy.

Math 581 - Topics in Math (Computational Methods in Complex Networks) *Fall 2020*

Introduction to computational methods and software for analyzing complex systems as well as applications of partition sampling to political redistricting.

Math 599 - Professional Development *Fall 2020, 2021, 2022*

This course helps advanced graduate students prepare for the academic and industry job markets, providing advice and feedback about preparing job materials, practice interviews and talks, and other professional preparation.

Metric Geometry and Gerrymandering Group Cambridge, MA
VRDI Instructor *Summer 2018, 2019*

· Organized and led student research groups during an eight week summer program on political redistricting for 80+ graduate and undergraduate students. Met with students daily and both generated and supervised a wide variety of research projects in computational, mathematical, and political topics.

Tufts University Medford, MA
Co-Instructor *Spring 2019*

· Co–taught STS 10: Reading Lab on Mathematical Models in Social Context. This is a reading and discussion based course providing an STS perspective to students who are taking modeling classes.

Massachusetts Institute of Technology Cambridge, MA
IAP Instructor *January 2019*

· Developed a four-week course on computational methods for political redistricting. The course incorporated cutting edge mathematical and computational techniques for analyzing gerrymandering.

Dartmouth College Hanover, NH
Graduate Instructor *Fall 2015 - Spring 2018*

· Designed syllabi and daily lectures. Wrote and graded homework, quizzes, and exams.

Math 36/QSS 36 - Mathematical Modeling in the Social Sciences *Fall 2017*
Data driven course exploring mathematical models and analysis techniques

UNSG 100 - Graduate Ethics Seminar *Fall 2017, 2016, 2015*
Seminar on ethical and professional issues in science and mathematics

Math 8 - Calculus of Functions of one and Several Variables *Winter 2017*
Second term calculus course covering infinite series, vector functions, and partial derivatives

Math 1 - Calculus with Algebra *Fall 2015*
Introductory calculus course with an emphasis on limits and differentiation

Teaching Assistant *September 2013 - June 2015*

· Held tutorial sessions three times per week. Graded quizzes and exams.

Math 23 - Differential Equations *Spring 2015*
Math 22 - Linear Algebra with Applications *Fall 2014*
Math 3 - Calculus *Winter 2014*
Math 12 - Calculus Plus *Fall 2013*

Washington State University Pullman, WA
Undergraduate Teaching Assistant *August 2012 - May 2013*

· Held tutorial sessions and graded homework and exams. Supervised a mathematical computing lab.

Math 320 - Modern Algebra *Spring 2013*
Math 330 - Secondary Teaching *Spring 2013*
Math 315 - Differential Equations *Fall 2012*

RESEARCH SUPERVISION

Postdoctoral Mentor

- Dr. Zhanzhan Zhao (SLMath Postdoc Fall 2023)
  - Topic: Applying Graph Partition Sampling to Optimize School Districts

PhD Advisor

- Weiwei Xie (Coadvised with Dean Johnson WSU Statistics 2022 -)
  - Topic: Ordinal Pattern Analysis for Time Series
- Phousawanh Peaungvongpakdy (WSU Mathematics 2022 -)
  - Topic: Mathematical and Computational Democracy
- Dr. Md. Mahedi Hasan (WSU Statistics 2022-2025)
  - Thesis: Inference, Aggregation, and Embedding for Learning Problems on Network and Time Series Data
- Dr. Swarnita Chakraborty (Coadvised with Jan Dasgupta WSU Statistics 2021 - 2023)
  - Thesis: A Novel Approach to Multiple Hypothesis Testing Under Dependence and Insights for Inference on Random Dot Product Networks

PhD Committee Member

- Allison Roberson (WSU Math 2024-2025)
- Nathaniel Parks (WSU Math 2023-2025)
- Patrick Gambill (WSU Math 2022-)

- Garrett Kepler (WSU Math 2022-)
- Yanan Tang (WSU Statistics 2022-2025)
- Ben Hellwig (WSU Math 2022-2025)
- Wiriyaporn Laaied (WSU Statistics 2022-2025)
- Katrina Sabochick (WSU Math 2021-2023)
- Faizah Alanazi (WSU Math 2021)

MS Project Supervisor

- Jon Widen (WSU Statistics 2024-2025)
  - Gap analysis of ranked partition data
- Garrett Kepler (WSU Statistics 2023-2025)
  - Sampling Spectrally Similar Graphs
- Phousawanh Peaungvongpakdy (WSU Statistics 2022-2025)
  - Topic: (Parallel Tempered) Short Burst Optimization for Redistricting
- Qingwei Qiao (WSU Statistics 2023 - 2024)
  - Project: Do Social Network Strengths Affect Policy Interventions? Evidence from a Field Experiment in Madagascar
- Sahil Patil (WSU Statistics 2023 - 2024)
  - Project: Impact of adapting annealing schedules on a pricing algorithm
- Anastasia Vishnevskaya (WSU Statistics 2021-2022)
  - Project: Exploring China's Twiplomacy: Social Network and Sentiment Analysis of the 'Chinese Embassy in the US' Twitter Account
- James Asare (WSU Applied Math 2020-2021)
  - Project: Analysis of Optimized Plans for School Redistricting

MS Committee Member

- David Rice (WSU MS Statistics 2023-2025)
- Chuhua Ying (WSU MS Statistics 2023-2025)
- Sita Khanal (WSU MS Statistics 2023-2025)
- Star Oje (WSU MS Statistics 2023-2025)
- Alexandra Johnson (WSU MS Maht 2023-2024)
- Nathaniel Parks (WSU MS Math 2023-2024)
- Allison Roberson (WSU MS MAth 2023-2024)
- Tamara Trbojevic (WSU MS Applied Math 2022-2023)
- Shivani Sawant (WSU MS Statistics 2022-2023)
- Almira Salimgarieva (WSU MS Statistics 2022-2023)
- Jiwen Qiu (WSU MS Statistics 2022-2023)

BS Project Supervisor

- Olivia McGrew (WSU Math 2024 -)
  - Project: Optimization of Elevator Scheduling
- Kallie Distler (WSU Psychology 2022-2023)
  - Project: Null Models for Social Network Analysis of Elementary School Students
- Eric Johnson (WSU Math 2022-2023)
  - Project: Dynamics of Voting Networks: Implications for Fairness, Representation, and Accountability
- Zhiyaun (Freeman) Chen (WSU Data Analytics 2022)
  - Project: Spatial Influences on Vote Modeling in Washington State
- Elliot Kimsey (WSU Data Analytics 2021-2022)
  - Project: Analysis of Malapportionment on Washington State Dual Graphs
- Karthik Ayyalasomayajula (WSU Data Analytics 2022)
  - Project: Geo-Spatial Analysis of Ranked Choice Voting in Maine Congressional Elections
- Rishabh Chandra (MIT EECS UROP 2019-2020)
  - Project: Reinforcement Learning for Graph Partitions

High School Project Supervisor

- Kabir Shah (2024-)
  - Project: Sampling Hamiltonian Cycles
- Harrison Roth (Paul D. Schreiber Senior High School Math Research Program 2022-2024)
  - Project: Gerrymandering: Properties of Nested Districts with Application to Illinois
  - Regeneron STS Top 300 Scholar 2024
- Brian Pae (Collegiate School Science and Engineering Research Program 2022-2024)
  - Project: Computational Redistricting Analysis of Incumbency in New York

EDUCATIONAL OUTREACH

CISER Workshop on analyzing gerrymandering in political redistricting with GerryChain
Pullman, WA
Instructor *March 2024*

· Designed and presented interactive course materials on computational redistricting. The interdisciplinary approach attracted participants from a wide variety of departments and colleges at WSU.

AMS Engaged Pedagogy Series Zoom
Instructor *Spring 2023*

· Designed and presented interactive course materials on gerrymandering and computational redistricting for instructors across the country together with other experts in the Mathematical Foundations for Democratic Processes program.

CISER Workshop on Python for Social Network Analysis Pullman, WA
Instructor *March 2023*

· Designed and presented interactive course materials on network science and the networkx package in Python. The interdisciplinary approach attracted students from eleven different departments around the WSU campus.

UW Data Science for Social Good Seattle, WA
Project Lead *Summer 2021*

· Designed and supervised a research project for four data science fellows on applications of ensemble methods to initial districting plan evaluation. The fellows gave a public presentation of their work and developed a user guide "Applying GerryChain: A User's Guide for Redistricting Problems" with accompanying website, case studies, and code examples to demonstrate good modeling practives and support other researchers working on these problems.

New Hampshire State Math Team Manchester, NH
Math Team Coach *Fall 2018–2020*

· Designed practice problems and preparatory exercises for the AMC exams, ARML, MMATH, and HMMT. Led monthly problem solving sessions and group activities.

LaTeX Workshops Hanover, NH
Organizer *Fall 2016–May 2018*

· Designed and presented a series of eleven one hour–long and two three hour–long workshops on mathematical typesetting in LaTeX with D. Freund and K. Harding.

Crossroads Academy Math Team Lyme, NH
Math Team Coach *September 2015 – May 2018*

· Designed practice problems and preparatory exercises for the AMC exams, MathCounts, and MathLeague. Led weekly problem solving sessions and group activities. During 2015–17, the Crossroads team twice won the Chapter and State MathCounts and MathLeague competitions and placed first in Northern New England on the AMC-8.

New Hampshire State MathCounts Team Lyme, NH
Math Team Coach *March 2017 – May 2017*

· Designed practice problems and preparatory exercises for the national MathCounts exam. Led biweekly problem solving sessions and group activities. Students competed in the national competition in Orlando, Florida.

Johns Hopkins Center for Talented Youth Science and Technology Series Hanover, NH
Workshop Leader

· Developed and presented hour–long workshops for high school students.

Binary and Barcodes (with D. Freund)	*April 2017*
Forensic Accounting	*April 2016*
Modern Cryptography (with D. Freund)	*October 2014*

Dartmouth College Exploring Mathematics Camp Hanover, NH
Co-Instructor

· Organized and presented week long math camps for high school students.

Mathematics of Games	*August 2015*
Cryptography	*July 2015*

RESEARCH PRESENTATIONS

Talks

121. Joint Statistical Meetings 2025, Nashville, TN *August 2025*
Clustering and Inference of Ballot Models for VRA Analysis

120. ICERM Workshop on Applied Math in Statistics and Data Science Education, Providence, RI *May 2025*
Motivating Data Cleaning with Election Returns

119. USFCA AI for Redistricting Guest Lecture, San Fransisco, CA *April 2025*
Pair-y-Mandering: Applications of Perfect Matchings

118. Math Colloquium, Cal Poly, San Luis Obispo, CA *January 2025*
Political Geometries: Analyzing Fairness in Redistricting with Mathematics

117. Math Colloquium, University of Georgia, Athens, GA *January 2025*
Political Geometries: Analyzing Fairness in Redistricting with Data-Driven Mathematics

116. Math Colloquium, College of the Holy Cross, Worcester, MA *January 2025*
Political Geometries: Analyzing Fairness in Redistricting with Mathematics

115. Stats Colloquium, Vassar College, Poughkeepsie, NY *January 2025*
Political Geometries: Analyzing Fairness in Redistricting with Statistics

114. Math Colloquium, Ohio State University, Columbus, OH *January 2025*
Political Geometries: Analyzing Fairness in Redistricting with Data

113. Math Colloquium, Harvey Mudd College, Claremont, CA *December 2024*
Political Geometries: Analyzing Fairness in Redistricting with Mathematics

112. Math Colloquium, Claremont McKenna College, Claremont, CA *December 2024*
Political Geometries: Analyzing Fairness in Redistricting with Data

111. SDS Colloquium, College of Wooster, Wooster, OH *November 2024*
Detecting Pair-y-mandering and Multi-Balanced Redistricting

110. Fearless Friday, Colorado College, Colorado Springs, CO *November 2024*
Political Geometries: Studying Fairness in Redistricting With Mathematics

109. MGGG Lab Seminar, Ithaca, NY (Zoom) *October 2024*
Clustering on the Ballot Graph

108. INFORMS Annual Meeting, Seattle, WA *October 2024*
Local Walks and Network Partitioning for Discrete Redistricting Problems

107. Joint Statistical Meeting, Portland, OR *August 2024*
Studying Social Network Dynamics: Addressing Aggregation Challenges and Modeling Language Risk

106. Whitman County Library Summer Reading Program, Uniontown, WA *August 2024*
The Mathematics of Secret Codes

105. Whitman County Library Summer Reading Program, Uniontown, WA *July 2024*
The Mathematics of Voting: Apportionment, Runoffs, and Gerrymandering

104. SIAM Annual Meeting, Spokane, WA *July 2024*
Panel: Math for Elections, Elections for Math

103. SIAM Annual Meeting, Spokane, WA *July 2024*
Evaluating Redistricting Justifications with Local Tree Walks

102. ICMS Workshop on Voting and Representation, Edinburgh, Scotland *June 2024*
Local Walks on Trees

101. NWPR How Data Shapes the World Around You, Richland, WA *May 2024*
Redistricting and Public Data

100. SIAM Linear Algebra Conference, Paris, France *May 2024*
Motivating Linear Algebra Concepts and Computations with Network Science

99. USFCA AI for Redistricting Guest Lecture, San Fransisco, CA *April 2024*
Pair-y-Mandering: Applications of Perfect Matchings

98. WSU PNNL D4 Seminar, Pullman, WA *April 2024*
Two Applications of Absorbing Markov Chains

97. WSU Mathematical Biology Seminar, Pullman, WA *March 2024*
Network and Geospatial Dynamics in Compartmental Epidemiology

96. Rochester Institute of Technology Complexity Lab Seminar, Rochester, NY *February 2024*
Partitions of Census Networks for Redistricting Analysis

95. WSU COLA NUTS Seminar, Pullman, WA *January 2024*
Sampling Stirling Numbers and Global Centrality Measures on Trees

94. WUSTL Physics Theory Seminar, St. Louis, MO *November 2023*
Markov Chain Sampling of Graph Partitions for Analyzing Political Geometries

93. SLMath Network Science Seminar, Berkeley, CA *November 2023*
Multi-resolution Network Structures in Census Data

92. WSU-PNNL Data Day, Richland, WA *November 2023*
Multi-Objective Optimization for Computational Redistricting Problems

91. UI Math and Stats Colloquium, Moscow, ID *November 2023*
Political Geometries

90. SLMath Workshop on Randomization, Neutrality, and Fairness, Berkeley, CA *October 2023*
Optimization, Sampling, and Evaluating Non-Partisan Justifications

89. INFORMS Annual Meeting, Phoenix, AZ, *October 2023*
Multi-balanced Redistricting And Within-cycle Malapportionment In Computational Redistricting

88. SLMath Redistricting Working Group, Berkeley, CA *October 2023*
Introduction to MCMC (with Scrabble)

87. WSU Math/Stat Colloquium, Pullman, WA *September 2023*
Optimizing Tradeoffs in Redistricting and Within-Cycle Malapportionment

86. SLMath Connections Workshop 5 Minute Intro, Berkeley, CA *August 2023*
Mathematical and Computational Redistricting

85. MGGG Summer Program, Boston, MA *June 2023*
Computational Redistricting

84. IISE Annual Meeting, New Orleans, LA *May 2023*
Multi-Objective Optimization for Evaluating Within-Cycle Malapportionment

83. International Linear Algebra Society, Zoom *March 2023*
Applications of Linear Algebra to Graph Theory and Network Science

82. Fu Lab Seminar, Dartmouth College, Hanover, NH *February 2023*
Case Studies in Computational Redistricting

81. Joint Mathematics Meetings, Boston, MA *January 2023*
An Invitation to Computational Redistricting

80. University of Montana Math Colloquium, Missoula, MT *September 2022*
Graphs, Geometry, and Gerrymandering

79. Stanford and RDH Redistricting and Data Convening, Palo Alto, CA *September 2022*
Panelist: How to improve redistricting data sourcing & quality

78. MGGG Redistricting Lab, Medford, MA *August 2022*
Sampling Complexity and 'Practical' Inference on Network Models

77. Permutation Patterns, Valparaiso, IN *June 2022*
Enumerating Orderings on Matched Product Graphs

76. WSU Common Read Program, Pullman, WA *April 2022*
Algorithmic Bias and Modern Inequalities

75. PiMUC Plenary Talk, Pullman WA *April 2022*
Political Geographies: Graphs, Geometry, and Gerrymandering

74. SIAM Minisymposium "Mathematics of Complex Systems" JMM 2022, Seattle, WA *April 2022*
Initial Districting Design with Markov Chain Ensembles

73. Mathematics plus Democracy Seminar, NYU, New York, NY *March 2022*
Partisan Dislocation, Competitiveness, and Designing Ensembles for Redistricting Analysis

72. Fu Lab Seminar, Dartmouth College, Hanover, NH *February 2022*
Partisan Dislocation, Competitiveness, and Designing Ensembles for Redistricting Analysis

71. D4 Seminar PNNL–WSU, Pullman, WA *February 2022*
Sampling Complexity and 'Practical' Inference on Network Models

70. ADSA Annual Conference, Zoom *February 2022*
Democratizing Districting

69. Carter et al. v. Chapman et al. PA Commonwealth Court, Harrisburg, PA *January 2022*
Expert testimony for Gressman Math and Science Petitioners

68. Analysis Seminar, Pullman, WA *December 2021*
Introduction to Graphons I and II

67. PPPA Research Colloquium, Pullman, WA *November 2021*
Computational Methods for Evaluating Districting Plans

66. INFORMS Annual Meeting, Zoom *October 2021*
Algorithms And Analysis For Centered Redistricting Plans

65. WSU Math Club, Pullman, WA *October 2021*
Graphs, Geometry, and Gerrymandering

64. Civic Hackathon, Madison, WI *September 2021*
Introduction to Computational Redistricting

63. Harvard Redistricting Algorithms, Law, and Policy Cambridge, MA *September 2021*
Technical State of the Art for Computational Redistricting

62. ASA Joint Statistical Meeting, Zoom *August 2021*
Computational Methods for Assessing Political Redistricting Reforms

61. New Mexico Redistricting Commission, Santa Fe, NM *July 2021*
Markov chain ensemble metrics for evaluation of redistricting plans

60. Colorado College Summer Program, Colorado Springs, CO *June 2021*
Computational Redistricting Analysis

59. WSU Seminar in Statistics, Pullman, WA *April 2021*
Ensemble Analysis for the 2020 Redistricting Cycle

58. Princeton Gerrymandering Project, Princeton, NJ *March 2021*
Computational Redistricting in 2021

57. Combinatorics, Linear Algebra, and Number Theory, WSU, Pullman, WA *March 2021*
Gerry-Matchings and Pair-y-Mandering

56. JMM 2021, Washington DC *January 2021*
Short Course: Mathematical and Computational Methods for Complex Social Systems

55. INFORMS Special Session on Fairness in Operations Research, Baltimore, MD *November 2020*
Computational Methods For Assessing Districting Plans

54. WSU Seminar in Statistics, Pullman, WA *November 2020*
Statistical and Computational Methods for Assessing Political Redistricting

53. Pi MU Epsilon Lecture, St. Michael's College, Colchester, VT *October 2020*
Graphs, Geometry, and Gerrymandering

52. ADSA Annual Meeting, Zoom *October 2020*
Geospatial Data for Political Redistricting Analysis

51. Common Experience Lecture, Texas State University, San Marcos, TX *October 2020*
Graphs, Geometry, and Gerrymandering

50. Combinatorics, Linear Algebra, and Number Theory, WSU, Pullman, WA *September 2020*
Representations of $SL_2(\mathbb{Z}/p^n\mathbb{Z})$ and spectral properties of Bethe trees

49. CGAD-GTOpt Seminar, Washington State University, Pullman, WA, *July 2020*
Geometric and Optimization Problems Motivated by Political Redistricting

48. Redistricting Conference 2020, Duke University, Durham, NC, *March 2020*
Multiresolution Redistricting Algorithms

47. Math Department Colloquium, College of Charleston, Charleston, SC. *February 2020*
Geospatial Data, Markov Chains, and Political Redistricting

46. Math Department Colloquium, Washington State University, Pullman, WA. *January 2020*
Geospatial Data, Markov Chains, and Political Redistricting

45. JMM 2020, Denver, CO. *January 2020*
Markov chains for sampling connected graph partitions

44. Math Department Colloquium, Pacific University, Forest Grove, OR. *January 2020*
The Mathematics of Nested Legislative Districts

43. MIT Graphics Annual Retreat, North Falmouth, MA. *October 2019*
Connected Graph Partitions and Political Districting

42. Topology, Geometry and Data Seminar, Ohio State University, Columbus, OH. *September 2019*
Hardness results for sampling connected graph partitions with applications to redistricting

41. Math Department Colloquium, Denison University, Granville, OH. *September 2019*
Graphs, Geometry, and Gerrymandering

40. Math Department Colloquium, Oberlin College, Oberlin, OH. *September 2019*
Graphs, Geometry, and Gerrymandering

39. Math Department Colloquium, College of Wooster, Wooster, OH. *September 2019*
Graphs, Geometry, and Gerrymandering

38. Math Monday Colloquium, Kenyon College, Gambier, OH. *September 2019*
Graphs, Geometry, and Gerrymandering

37. Applied Math Seminar, University of Massachusetts Lowell, Lowell, MA. *September 2019*
Hardness results for sampling connected graph partitions with applications to redistricting

36. Math Department Colloquium, Yale University, New Haven, CT. *August 2019*
Mathematical Challenges in Neutral Redistricting

35. Voting Rights Data Institute Seminar, Cambridge, MA. *June 2019*
A Friendly Introduction to Discrete MCMC

34. Voting Rights Data Institute Seminar, Cambridge, MA. *June 2019*
Graphs and Networks: Discrete Approaches to Redistricting

33. Math Department Colloquium, Dartmouth College, Hanover, NH. *April 2019*
Total Variation Isoperimetric Profiles and Political Redistricting

32. ACM Seminar, Dartmouth College, Hanover, NH. *April 2019*
Hardness results for sampling connected graph partitions with applications to redistricting

31. Unrig Summit Masterclass, Nashville, TN. *March 2019*
Legal and Math Deep Dive: Gerrymandering and Redistricting

30. MIT Graphics Seminar, Cambridge, MA. *March 2019*
Computational Challenges in Neutral Redistricting

29. JMM 2019, Baltimore, MD. *January 2019*
Matched Products and Stirling Numbers of Graphs

28. Societal Concerns in Algorithsm and Data Analysis, Weizmann Institute of Science, Rehovot, Israel. *December 2018*
Computational Problems in Neutral Redistricting

27. Math and Law of Redistricting, Radcliffe Institute, Cambridge, MA. *December 2018*
GerryChain and MCMC tutorials

26. Math Colloquium, Tufts University, Medford, MA. *November 2018*
Matched Products and Stirling Numbers of Graphs

25. MIT Graphics Annual Retreat, Dedham, MA. *October 2018*
Mathematical Challenges in Neutral Redistricting

24. SAMSI Workshop on Quantitative Redistricting, Duke University, Durham, NC. *October 2018*
Compactness Profiles and Reversible Sampling Methods for Plane and Graph Partitions

23. Election Teach–in, SMFA, Boston, MA. *October 2018*
Computational Challenges in Political Redistricting

22. STS Seminar, Tufts University, Cambridge, MA. *September 2018*
Mathematical Modeling of Social Connections

21. Voting Rights Data Institute Seminar, Cambridge, MA. *June 2018*
Introduction to Monte Carlo Methods

20. Mathematics Colloquium, University of Central Florida, Orlando, FL. *February 2018*
Dynamical Models for Multiplex Data

19. Mathematics Colloquium GVSU, Grand Valley, MI. *February 2018*
Random Walk Null Models for Time Series

18. Omidyar Fellowship Presentation, Santa Fe, NM. *January 2018*
Mathematical Embeddings of Complex Systems

17. Mathematics Colloquium at University of San Fransisco, San Fransisco, CA. *January 2018*
Dynamical Models for Multiplex Data

16. Mathematics Colloquium at Providence College, Providence, RI. *January 2018*
Dynamical Models for Multiplex Data

15. JMM, San Diego, CA. *January 2018*
Dynamical Modeling for Multiplex Networks

14. International Complex Networks Conference Lyon, France. *December 2017*
Multiplex Dynamics on the World Trade Web

13. Physics Colloquium at Washington University, St. Louis, MO. *October 2017*
Spectral Clustering on Multiplex Data

12. SIAM Annual Meeting, Pittsburgh, PA. *July 2017*
Permutation Complexity Measures for Time Series

11. Applied and Computational Mathematics Seminar, Hanover NH. *November 2016*
Random Dot Product Models for Weighted Networks

10. Inference on Networks: Algorithms, Phase Transitions, New Models and New Data, Santa Fe, NM. *December 2015*
Dynamically Motivated Models for Multiplex Networks

9. Applied Math Days, Troy, NY. *April 2015*
Multiplex Structure on the World Trade Web

8. Graduate Student Combinatorics Conference, Lexington, KY. *March 2015*
Total Dynamics on Multiplex Networks

7. Sixteenth International Fibonacci Conference, Rochester, NY. *July 2014*
Enumerating Distinct Chessboard Tilings

6. Dartmouth Graduate Student Seminar, Hanover, NH. *(Quarterly) 2013 - 2018*
Various Topics

5. Joint Mathematics Meeting, San Diego, CA. *January 2013*
Counting Combinatorial Rearrangements, Tilings with Squares and Symmetric Tilings

4. West Coast Number Theory Conference, Asilomar, CA. *December 2012*
Generalized Lucas Bases

3. Young Mathematician's Conference, Columbus, OH. *July 2012*
Combinatorial Rearrangements on Arbitrary Graphs

2. Northwest Undergraduate Mathematics Symposium, Portland, OR. *March 2012*
Combinatorial Rearrangements on Arbitrary Graphs

1. WSU Graduate Seminar on Combinatorial Geometry, Pullman, WA. *(Quarterly) 2012-2013*
Various Topics

Posters

5. SIAM Workshop on Network Science, Boston, MA. *July 2016*
Generalized Random Dot Product Models For Multigraphs

4. Dartmouth Graduate Student Poster Session, Hanover, NH. *April 2016*
Generalized Dot Product Models for Weighted Networks

3. Dartmouth Graduate Student Poster Session, Hanover, NH. *April 2015*
   Multiplex Structures in the World Trade Web

2. WSU SURCA, Pullman, WA. *March 2013*
   Empirical Analysis of Space Filling Curves for Scientific Computing Applications

1. WSU SURCA, Pullman, WA. *April 2012*
   Combinatorial Rearrangements, Restricted Permutations, and Matrix Permanents

HONORS AND AWARDS

- WSU Office of Academic Engagement Partner in Excellence Award *2025*
- University of Chicago Outstanding Educator Award *2024*
- WSU CAS Early Career Achievement Award for Tenure Track Faculty *2023*
  College-wide award for outstanding accomplishments in research early in the professional career
- Dartmouth Hannah Croasdale Award *2018*
  College-wide award for the graduating Ph.D. student that best exemplifies the qualities of a scholar.
- Dartmouth Graduate Student Teaching Award *2017*
  College-wide award for the graduate student who best exemplifies the qualities of a college educator.
- Dartmouth Graduate Fellowship *2014–18*
- NSF Graduate Research Fellowship: Honorable Mention *2014, 2015*
- Dartmouth GAANN Fellowship *2013*
- WSU Morris Knebelman Outstanding Senior Award *2013*
- WSU Department of Mathematics Outstanding Senior *2013*
- WSU Emeritus Society Award in the Physical Sciences *2013*
- WSU J. Russell and Mildred H. Vatnsdal Memorial Scholarship *2012*
- WSU SURCA Crimson Award: Computer Science and Mathematics *2012, 2013*
- WSU Auvil Undergraduate Scholars Fellowship *2012*
- WSU Leonard B. Kirschner Scholarship *2012*
- WSU College of Sciences Undergraduate Research Grant *2012*
- Norma C. Fuentes and Gary M Kirk Award for Excellence in Undergraduate Research *2012*

PROFESSIONAL SERVICE

Academic Community Service

- Elected ASA Statistical Consulting Section Publications Officer *2025-2026*
- Coorganized AIM Workshop on Mathematical Foundations of Sampling Connected Balanced Graph Partitions *June 2025*
- Organized SIAM Annual Meeting Minisymposium *July 2024*

WSU Service

- Faculty Advisor to the Student Chapter of the American Math Society *2024-2025*
- Data Analytics Scholarly Track Hiring Committee (Chair) *2024-2025*
- Data Analytics WADEPS Intern Mentor *2024-2025*
- STEM Student Engagement Research and Mentoring Program Mentor Coordinator *2024-2025*
- CISER Postdoc Hiring Committee *2023-2024*
- Data Analytics Scholarly Track Hiring Committee *2023-2024*
- Department Colloquium Committee (Chair) 2022-
- Department Research Committee 2022-2024
- STEM Student Engagement Research and Mentoring Program *2022-2025*
- Data Analytics Faculty Advisory Board *2022-2025*
- Statistics TT Hiring Committee *2022-2023*
- Math Club Faculty Advisor *2021-2023*
- SURCA Judge *2021-2025*

- Core to Career Faculty Fellow (DATA 115) *2021-2022*
- Data Analytics Curriculum Committee *2020-2025*

Peer Reviewer

- Statistics and Public Policy
- American Politics Research
- SIAM Symposium on Algorithm Engineering and Experiments
- Nature Human Behavior
- Journal of Empirical Legal Studies
- Banff International Research Station (Workshop Review)
- European Political Science Review
- Operations Research
- The American Statistician
- Political Analysis
- Social Forces
- Notices of the AMS
- Royal Society Open Science
- IISE Annual Conference
- AMS American Mathematical Monthly
- Nature Scientific Data
- Operations Research Forum
- Journal of Computational Social Science
- INFORMS Journal on Applied Analytics
- Proceedings of the National Academy of Sciences (PNAS)
- Algebra Colloquium
- Computers & Graphics
- Election Law Journal
- Transactions on Signal and Information Processing over Networks
- Multiscale Modeling and Simulation: A SIAM Interdisciplinary Journal
- International Conference on Learning Representations (ICLR)
- International Conference on Artificial Intelligence and Statistics (AISTATS)
- AAAI Conference on Artificial Intelligence (AAAI)
- International Conference on Machine Learning (ICML)
- ACM-SIAM Symposium on Discrete Algorithms (SODA)
- Neural Information Processing Systems (NeurIPS)
- Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- Chaos: An Interdisciplinary Journal of Nonlinear Science
- Involve: A Journal of Mathematics
- Entropy
- Algorithms
- MATCH Communications in Mathematical and in Computer Chemistry

PROFESSIONAL MEMBERSHIPS

- Institute for Mathematics and Democracy *invited April 2022*
- American Statistical Association (ASA) *joined June 2022*
- Society for Industrial and Applied Mathematics (SIAM) *joined June 2016*
- Fibonacci Association (FA) *joined February 2013*
- American Mathematical Society (AMS) *joined April 2012*
- Mathematical Association of America (MAA) *joined April 2012*